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ARMY MEDICAL RESEARCH INST OF INFECTIOUS DISEASES FR--ETC F/G 6/5
FEMORAL VENIPUNCTURE FOR REPEATED BLOOD SAMPLING IN MINIATURE S--ETC(U)
SEP 77 J R BROWN, E A TYERYAR, D G HARRINGTON

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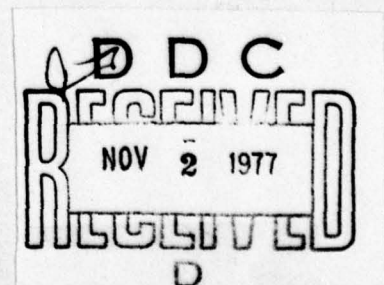
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FEMORAL VENIPUNCTURE FOR REPEATED BLOOD SAMPLING IN MINIATURE SWINE^{1,2}

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM																
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER																
4. TITLE (and Subtitle) Femoral Venipuncture for Repeated Blood Sampling in Miniature Swine		5. TYPE OF REPORT & PERIOD COVERED Interim																
7. AUTHOR(s) James R. Brown, Edward A. Tyeryar, Donald G. Harrington, and Duane E. Hilmas		6. PERFORMING ORG. REPORT NUMBER																
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Medical Research Institute of Infectious Diseases SGRD-UIA-A Fort Detrick, Frederick, Maryland 21701		8. CONTRACT OR GRANT NUMBER(s)																
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62776A 3M762776A841 00 008																
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 30 Sep 77																
		13. NUMBER OF PAGES 17																
		15. SECURITY CLASS. (of this report) UNCLASSIFIED																
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE																
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		<table border="1"> <tr> <td colspan="2">ACCESSION for</td> </tr> <tr> <td>NTIS</td> <td>White Section <input checked="" type="checkbox"/></td> </tr> <tr> <td>DDC</td> <td>Buff Section <input type="checkbox"/></td> </tr> <tr> <td>UNANNOUNCED</td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="2">JUSTIFICATION</td> </tr> <tr> <td colspan="2">BY</td> </tr> <tr> <td colspan="2">DISTRIBUTION/AVAILABILITY CODES</td> </tr> <tr> <td>Dist.</td> <td>AVAIL. and/or SPECIAL</td> </tr> </table>	ACCESSION for		NTIS	White Section <input checked="" type="checkbox"/>	DDC	Buff Section <input type="checkbox"/>	UNANNOUNCED	<input type="checkbox"/>	JUSTIFICATION		BY		DISTRIBUTION/AVAILABILITY CODES		Dist.	AVAIL. and/or SPECIAL
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18. SUPPLEMENTARY NOTES Reprints bearing assigned AD number will be forwarded upon receipt. To be submitted for publication in <u>Laboratory Animal Science</u> .																		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Femoral vein Repeated blood sampling Miniature swine																		
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FEMORAL VENIPUNCTURE FOR REPEATED BLOOD SAMPLING IN MINIATURE SWINE^{1,2}

Short title: REPEATED FEMORAL VENIPUNCTURE IN MINIATURE SWINE

FOOTNOTES

¹In conducting the research described in this report, the investigators adhered to the "Guide for the Care and Use of Laboratory Animals," as promulgated by the Committee on the Revision of the Guide for Laboratory Animal Facilities and Care of the Institute of Laboratory Animal Resources, National Research Council. The facilities are fully accredited by the American Association for Accreditation of Laboratory Animal Care.

²The views of the authors do not purport to reflect the positions of the Department of the Army or the Department of Defense.

JAMES R. BROWN, EDWARD A. TYERYAR, DONALD G. HARRINGTON, D.V.M., AND
DUANE E. HILMAS, D.V.M., Ph.D.

FOOTNOTE

³Present address: Chief, Office for Wholesomeness of Irradiated Foods,
U.S. Army Medical Research & Development Command, Washington, DC 20314.

From the U. S. Army Medical Research Institute of Infectious Diseases,
Fort Detrick, Frederick, MD 21701. Reprint requests to Mr. James R.
Brown at this address.

KEY WORDS: Femoral vein

Repeated blood sampling

Miniature swine

SUMMARY A method for repeated blood sampling of miniature swine from the femoral vein was evaluated. The procedure was shown to be satisfactory for sequential blood sampling in long-term studies.

The anatomic and physiologic similarities of miniature swine to man make this animal species particularly useful in studies involving nutrition, immunology, dentistry, radiology, and cardiovascular physiology (1). One serious limitation in the use of miniature swine has been the difficulty of obtaining sequential blood samples without catheterization or unusual restraint (2,3). Phlebotomy from the cranial vena cava has been the most common method used for routine blood sampling (2-5). Other anatomical locations for collection of blood samples have been described and include the external jugular vein (6), cephalic or saphenous vein (7,8), femoral artery (9), orbital sinus (10), and middle sacral artery (11). Ear veins or tail veins have also been used when only periodic bleeding is required, but are unsatisfactory for repeated sampling (2). Each of these locations may be used successfully, but all have limitations which preclude their satisfactory use for repeated blood sampling in long term studies. A major disadvantage of the cranial vena cava site for phlebotomy is the likelihood of damaging heart-base and other major vessels upon repeated sampling. Furthermore, since both the phrenic nerve and the thoracic duct lie on the left side, the site of needle insertion for cranial vena cava phlebotomy should be limited whenever possible to the right side to minimize injury to the phrenic nerve or penetration of the thoracic duct. Most of the other techniques for obtaining sequential blood samples require some surgical manipulation for catheter implantation. Catheters require considerable time and effort to maintain their patency and are frequently dislodged by the animal in long-term studies. Requirements in our laboratory for a simple, reliable, and safe method for repeated blood sampling over long periods of time in chronic low-dose radiation exposure studies

necessitated evaluation of a new procedure. This report describes a simple method for venipuncture of the femoral vein which permits repeated sampling.

MATERIALS AND METHODS

The procedure requires that swine be placed in dorsal recumbancy. Positioning was most easily accomplished by placing the animal in a V-shaped trough, which may be fabricated of any durable, light weight, and easily cleaned material. Restraint requires a minimum of two assistants: one to hold the front legs and restrain the head, and the other to hold the rear legs.

The femoral vein lies medial to the femoral artery below subcutaneous fat and muscle masses; the latter was not generally palpable as it is in other commonly used laboratory animals. The skin was penetrated on either side in the inguinal area approximately 2.5 cm laterally to the most posterior mammary gland with a 21-gauge, 1 1/2 inch needle. The needle was directed vertically and slight negative pressure maintained in the syringe as the needle was advanced so that blood was aspirated once the vein was penetrated. The depth of penetration to reach the femoral vein was dependent on the size of the animal. For example, a swine weighing 25 kg required a depth of approximately 1 cm to penetrate the femoral vein. No difficulty has been encountered in repeated blood sampling of miniature swine with weights up to 65 kg. The anatomical location of the puncture site is shown in Figure 1.

A two-step procedure was used to show that the phlebotomy site was the femoral vein. A 50-ml volume of radiopaque contrast agent, diatrizoate meglumine and diatrizoate sodium (Renografin-76^R, E. R.

Squibb and Sons, Inc., Princeton, N. J. 08540) was injected into the left saphenous vein of an anesthetized miniature swine. During injection, a ventral-dorsal (V.D.) radiograph was taken of the pelvic area which outlined the location of the left femoral vein (Figure 2). The site along the femoral vein which is readily accessible for repeated phlebotomy is shown in Figures 3 and 4. The femoral vein was likewise identified by a surgical cut-down at the phlebotomy site, and a 21-gauge pediatric intravenous injection catheter was inserted at that point. A 50-ml volume of diatrizoate meglumine and diatrizoate sodium was injected through the catheter. During injection both V.D. and lateral view radiographs of the pelvic area were taken. The catheter tip (arrows, Figures 3 and 4) shows the exact femoral vein phlebotomy site.

DISCUSSION

Femoral venipuncture has been used successfully in two long-term studies involving 14 miniature swine in each study. Blood volumes of 10 ml were collected daily for 14 consecutive days and continued bi-weekly for periods of up to four months. Hemostasis was easily accomplished by applying moderate pressure at the needle insertion site. There has been no evidence of injury, or any other complications in any of the swine bled by this method. The procedure has proven to be easily mastered by technicians and has been entirely satisfactory for sequential blood sampling in long-term studies.

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LEGENDS FOR FIGURES

Fig. 1. Anatomical location of puncture site.

Fig. 2. Radiograph of pelvic area showing femoral vein outlined with radiopaque contrast agent.

Fig. 3. Radiograph showing catheter inserted in femoral vein. Arrow shows catheter tip at phlebotomy site.

Fig. 4. Radiograph (lateral view) showing catheter inserted in femoral vein. Arrow shows catheter tip at phlebotomy site.

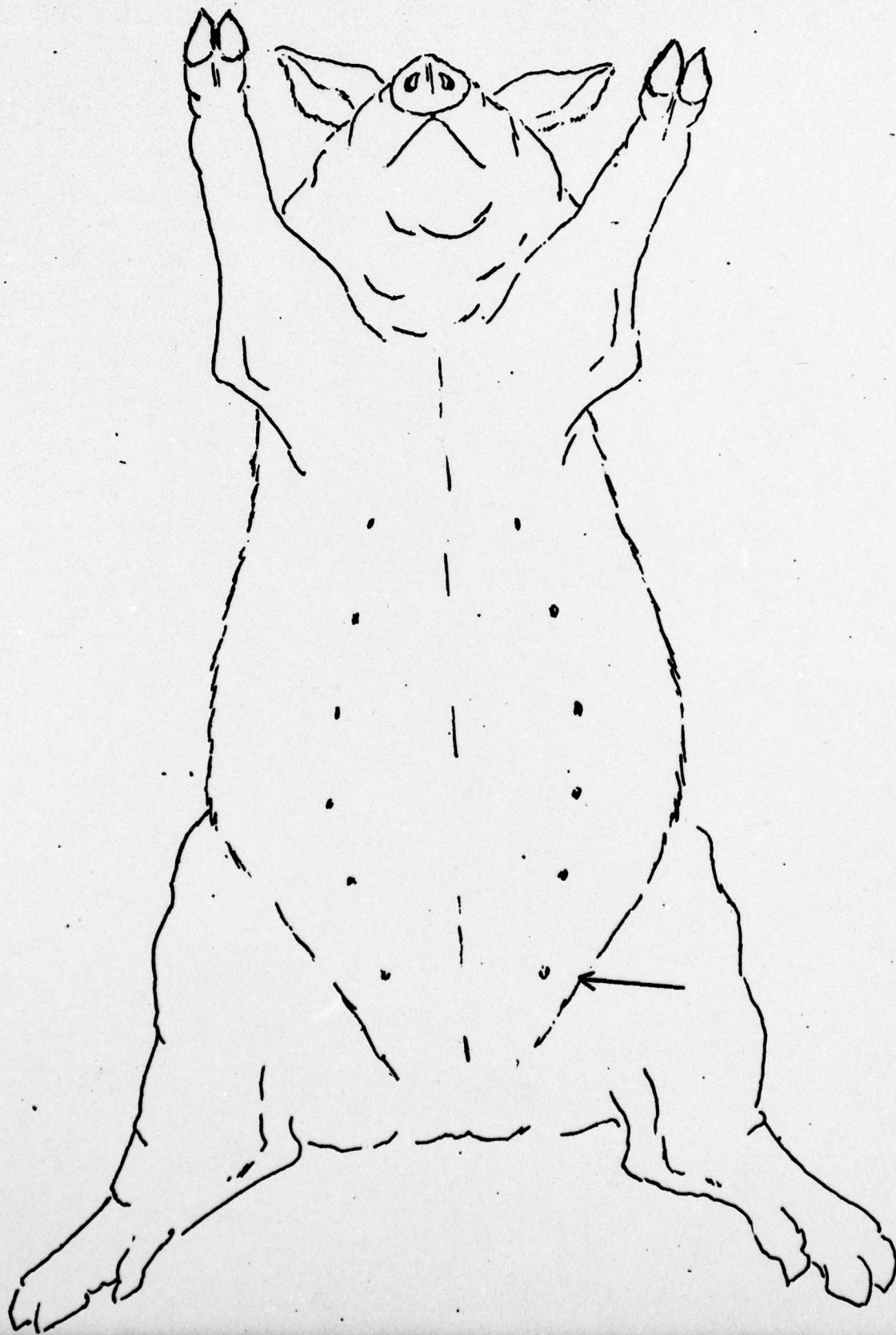


Fig. 2



Fig. 3



Fig. 4

